REMARKS

The Official Action dated October 31, 2005 has been received and its contents carefully noted. In view thereof, claims 1, 5 and 11 have been amended and new claim 14 has been added in order to better define that which Applicants regard as the invention. Further, in that the previous Office Action has been made final by the Examiner, filed concurrently herewith is a Request for Continued Examination. Accordingly, it is respectfully requested that the foregoing amendments be entered and fully considered by the Examiner. With the foregoing amendments, claims 1, 2, 4, 5 and 7-14 presently pending in the instant application.

Referring now to the Official Action and particularly paragraph 3 thereof, Applicants hereby acknowledge the Examiner's indication that the verified translation of Japanese Patent Application 2000-117680 has been deemed persuasive to overcome the previous rejections in view of U.S. Patent No. 6,607,675 issued to Hsieh et al. Further, in paragraph 4 of the Office Action it is noted that the Examiner has provided Applicants with a copy of Provisional Patent Application No. 60/171,754 filed December 22, 1999 as evidence that the provisional application supports the Examiner's rejection. Further examination of the present invention and indication of its allowability is earnest solicited in view of the foregoing amendments and following remarks.

With reference to paragraph 2 of the Office Action, claims 1, 2, 4, 5 and 7-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,168,726 issued to Li et al. in view of U.S. Patent No. 6,485,988 issued to Ma et al. as evidenced by U.S. Patent No. 6,054,379 issued to Yau et al. This rejection is respectfully traversed in that the combination proposed by the Examiner neither discloses nor suggests that which is presently set forth by Applicants' claimed invention.

Particularly, as can be seen from the foregoing amendments, each of independent claims 1, 5 and 11 have been amended in order to recite that the carbon content of the organic/inorganic hybrid film is more than 25% and no more than 37%. This feature is neither disclosed nor suggested by the prior art of record.

As the Examiner points out, Li et al. discloses forming Black Diamond as discussed in column 3, line 52 of the reference at a low-k film on the insulating film on a interconnection and further goes on to state that "the preferred carbon content is between 5% and 20% atomic, more preferably between 6% and 10%" (column 4, lines 16-19 and Table 1, the spectra taken with FTIR). Li also discloses, though not pointed by the Examiner, that an atomic percentage of carbon is between and 5% and 25% as recited in claim 1 of the reference.

As the Examiner can readily appreciate, the atomic percentage of carbon in organic/inorganic hybrid film is 25% or less in Li while as specifically recited by Applicants' claimed invention is more than 25% and no more than 37%. This difference is more readily appreciated in that the problem to be solved and the effect of the present invention is significantly different from that set forth in Li.

In accordance with Applicants' claimed invention and as set forth in Applicants' specification, the percentage of carbon in the organic/inorganic hybrid film in accordance with Applicants' claimed invention is set forth relatively high, that being more than 25% and no more than 37% such that the oxidation caused by removing "CH" from SiCHO film results in the formation of a reformed film; the reformed film reacts with CF gas; which results in the etching proceeding as discussed in Applicants' specification at page 16 through page 18. That is, in accordance with Applicants' claimed invention, the purpose of the particular percentage is to etch the organic/inorganic hybrid film underlying the reformed film. With respect to the teachings of Li, this reference teaches that in order to form contact holes having high aspect ratios, oxygen or nitrogen gas should be added to the carbon-volatizing gas because such can avoid etching stops as noted from column 12, line 57 to column 13, line 6. In order words, in order to employ the etching stops, the lower the amount of carbon left the better. This feature is also set forth in Applicants' specification at page 21, lines 10-24.

In addition to the foregoing, the Examiner notes that that Li et al. does not teach that the organic/inorganic hybrid film have a low-k dielectric (e.g., Black Diamond) which may be etched by using an etchant comprising nitrogen. In this regard, the Examiner relies on the teachings of Ma et al., which in column 22, lines 18-40 teaches that an etching gas containing fluorine carbon and nitrogen may be used and surmises that it would have been obvious to one of ordinary skill in the art to modify the teachings of Li et al. by using an etching gas containing fluorine, carbon and nitrogen as disclosed by Ma et al. However, while the patent to Ma et al. discloses using low-k materials when forming the insulating layer 408 on the ferroelectric capacitor, Ma et al. further teaches that no hydrogen gas should be added to the etching gas that is used during the formation of the contact in the insulating layer to have it contacted with the ferroelectric capacitor as noted from column 5, lines 10-43. Particularly, several components except hydrogen such as fluorine carbon and nitrogen are listed as components for an etching gas. However, as noted hereinabove in accordance with claimed invention, the carbon content of the organic/inorganic hybrid film in accordance with Applicant's claimed invention is more than 25% and no more than 37% and Ma et al. clearly fails to disclose or remotely suggest this feature or the effect gained by such feature. That is, Ma et al. sets forth the etching gas as containing fluorine, carbon and nitrogen and that no hydrogen is added in the etching gas in order to retain the characteristics of the contact on the ferroelectric capacitor which is significantly different from that presently set forth by Applicants' claimed invention. Accordingly, it is respectfully submitted that one of ordinary skill in the art would not turn to the teachings of Ma et al. as suggested by the Examiner. Moreover, even if such teachings were combined with the teachings of Li et al. as suggested by the Examiner, such combination fails to result in that which is presently set forth by Applicants' claimed invention.

In addition to the foregoing, the Examiner relies on the teachings of Yau et al. as evidencing the teachings of Ma et al. In this regard, Yau et al. relates to a structure of a low-k film in fabricating duel damascene structures and discloses etching the low-k film with fluorine, carbon and oxygen ions as noted in column 12, line 25. However, like the foregoing references, Yau et al. fails to disclose or remotely suggest utilizing gases containing fluorine, carbon and nitrogen wherein the carbon content in the organic/inorganic hybrid film is more than 25% and no more than 37%.

Accordingly, it is respectfully submitted that Applicants' claimed invention set forth in each of independent claims 1, 5 and 11 clearly distinguish over the combination proposed by the Examiner in that none of the references, namely Li et al., Ma et al., and Yau et al. disclose the carbon content as being more than 25% and no more than 37% nor does the combination of such references disclose or remotely suggest such feature. Therefore, it is respectfully requested that the rejection of record be reconsidered and withdrawn by the Examiner, that claims 1, 2, 4, 5 and 7-13 be allowed and that the application be passed to issue.

With respect to new claim 14, this claim recites an etching method for plasma etching an organic/inorganic hybrid film represented by $SiC_xH_yO_z$ ($x>0$, $y\geq0$, $z>0$), comprising a first step of plasma etching the film with an etching gas containing fluorine, carbon and nitrogen and a second step of plasma etching the film with an etching gas containing fluorine and carbon but not containing nitrogen after the first step. In reviewing the prior art cited by the Examiner, it is respectfully submitted that Applicants' claimed invention as set forth in new independent claim 14 is neither disclosed in nor suggested by the prior art of record. Accordingly, it is respectfully submitted that Applicants' claimed invention as set forth in new independent claim 14 recites features not found in the prior art record and is in proper condition for allowance.

Therefore, in view of the foregoing it is respectfully requested that the rejection of record be reconsidered and withdrawn by the Examiner, that claims 1, 2, 4, 5 and 7-14 be allowed and that the application be passed to issue.

Should the Examiner believe a conference would be of benefit in expediting the prosecution of the instant application, he is hereby invited to telephone counsel to arrange such a conference.

Respectfully submitted,

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